

BY DIANA VOS,  
PROJECT WILD COORDINATOR

EDUCATING ABOUT WILDLIFE

# Sensible fish

*A resource for educators and youth*

**H**AVE YOU EVER thought about what it would be like to be a fish swimming in a pond or stream? Living in water is much different than living on land. Although fish have all the same senses that people do — they can see, hear, smell, feel and taste — they use their senses in ways much different than people. To get an idea of how fish sense their watery world, you don't need to jump into a lake. Just read on.

## Seeing through the eyes of a fish

Only a small amount of the light people can see reaches below the water's surface. So, there isn't really much light in a fish's world. On land people can often see for miles. In murky water fish can only see less than an inch away. Even in clear water they can't see very far. Most fish in fact are nearsighted and can only see a distance of 10 to 20 feet. How deep the water is also affects the amount of light there is. Light usu-

ally only reaches a few feet down so the deeper you go, the darker it gets. With less light, fewer colors can be seen.

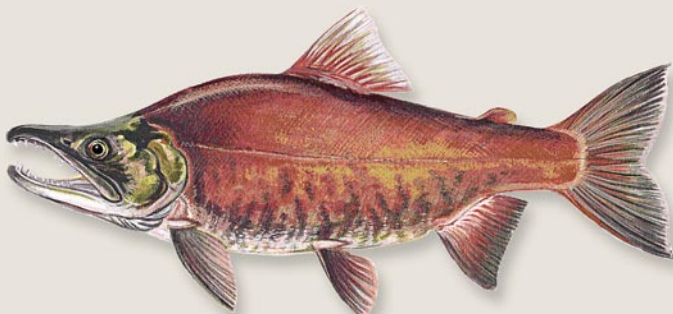
Fish such as blue gill, trout and minnows that feed during the day have very good vision and can see in a wide range of colors. Many kinds of fish can actually see color. Some can see at least 24 different shades of color.

Night feeders such as walleye and crappie trade good color vision for the ability to see well when there is not much light. Some of these fish have a special layer called the *tapetum lucidum* on the back insides of their eyes. This layer amplifies light going into the fish's eye by reflecting it back through the eyes of the fish a second time. Some of the light that is not absorbed by the eyes shines back out. This makes the fish's eyes glow in the dark. Nocturnal fish and those that live in deep water also have bigger eyes. Bigger eyes can capture more light and help the fish see better.

The lenses in the eyes of fish are round in shape. These round lenses are what lets them see clearly under water. If you were to open your eyes under water everything would look blurry. This is because the lenses in the eyes of people are flat instead of round. The lenses in fish eyes also bulge out through the iris (the col-

## Kokanee

Kokanee are a kind of landlocked sockeye salmon. Though landlocked, they, like other sea-going salmon, journey back to spawn in the stream in which they hatched. They use their sense of smell to find their way back to their specific stream and gravel bar.

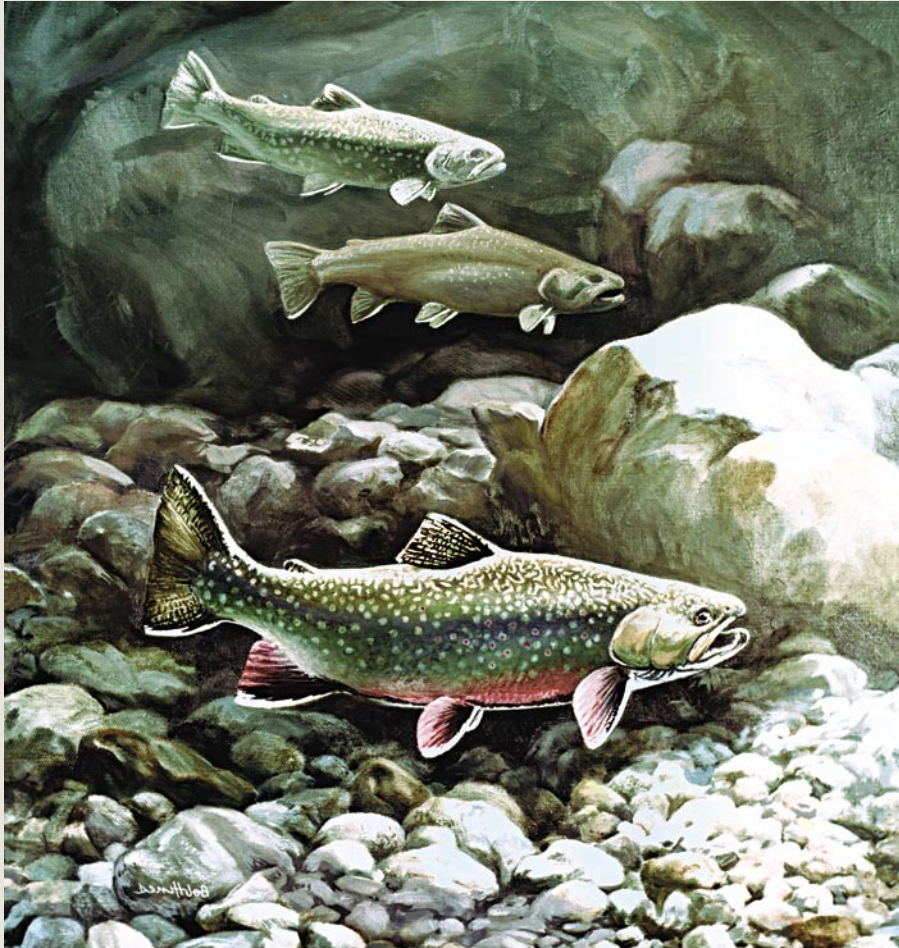


## Tiger Muskie

This fish is a hybrid of the northern pike and muskellunge. A solitary hunter, it lurks in cover then lunges after suitable prey that comes its way.



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**Brook trout**

ored part of the eye). This keeps a fish from being able to shrink its pupils in bright sunlight. That's why fish that

live in shallow water hang out in shaded areas. Fish also don't have any eyelids or tear glands. Since they live

in water and their eyes are always wet, tears for dry eyes are not needed. It also means a fish would win in a staring contest.

Fish eyes are best designed for seeing things that stand out from or contrast with the water around them. They also notice movement very well. A lightly colored moving object that shows up well against a dark background of water would likely catch a fish's eye. Though fish see contrast and movement well, most fish are not able to judge depth well. They see most things as flat, like looking at a picture of an object. People instead can see in 3-D. They can judge distances and shapes because their eyes face forward. The eyes of fish though are located on either side of their head. This makes it hard for them to tell how far away something is. Some predatory fish, like tiger muskies, that do need to know how far away something is so they can catch prey, have special grooves on their noses. These low areas let them see forward more easily giving them some sense of depth.

Instead of having 3-D vision, fish have excellent peripheral, or side vision. Fish can use each eye on its own to see things beside and even slightly behind them. They can also

### **Rainbow trout**

Native to streams of the Pacific Coast, rainbows live in cool, clear headwater creeks and larger streams. Here they seek out aquatic insects, snails, crayfish and small fish to snap up in their jaws.

### **Channel catfish**

Barbels hang from a catfish's face like a strange looking moustache. Barbels are actually fleshy structures. Catfish use their barbels to sense things they might eat.



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see what's above them. Many trout anglers know this and try to keep a low profile when moving towards a fish so they won't be spotted.

### Do fish smell? Do they taste good (well) too?

Fish do have a nose, but they don't breathe through it. But they still can smell very well. Fish can smell much better than people can and even better than a bloodhound. A fish's nostrils (*nares*) are found on its snout but they are not connected to the fish's throat. Most fish have at least two nostrils, but some have four or more. Inside the nostrils are millions of smell receptors that pass smell signals to the fish's brain. Fish respond to some odors by instinct and learn to recognize others over time.

Some fish use smell more than vision. Smell is used to find food and to sense danger. Both predatory fish and scavenger fish use odor to search for food. Scavenger fish use smell as their main sense to find food. Predators only use smell to make sure something they have found by sight or hearing is actually food. Some fish also use smell to tell them where to lay their eggs. Fish such as salmon that migrate use their noses to smell the odor of their home stream.

Fish are also good tasters. Their

tongue is covered with taste buds that can taste chemicals in the water. In many species, taste buds cover other parts of the body too such as the fish's fins, face and area near their tail. These fish can taste food before taking it into their mouth. Taste buds are wired to areas of the brain that operate reflexes. So snapping or biting at some tasty bait is an automatic reflex in most fish.

Most fish can taste pretty well, but catfish are virtual "swimming tongues." They are literally covered from head to tail with taste buds. Because of this, catfish can find food that is quite far away even in murky water. Many of a catfish's taste buds are packed into whisker-like barbells on its face that it drags along the lake bottom as it searches for food.

### Can fish hear?

Water is much denser than air so sound travels much faster in water than it does in air. Because of this, sound plays a very important role for fish. Even so, you have probably never seen a fish's ear. That's because they don't have outer ears. They do have ears inside their head though. The ears of fish are made up of bones called *otoliths*. The ear bones vibrate with pressure created by sound waves. The vibrations wiggle small hairs in the fish's ears sending a sound mes-

sage to the fish's brain. Fish, like bass, sometimes flee from noisy motors or approach sound-making lures. Scientists believe that at least some species of fish talk to each other with grunts, pops and squeaks they make.

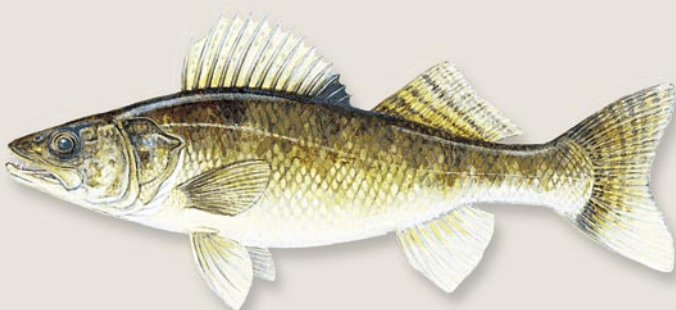
### Feeling in the water

Like people, fish can sense touch or pressure on their skin with normal touch receptors. They also have another special system known as the lateral line that senses vibrations and pressure better. The lateral line is a long thin groove that runs down each side of a fish's body from behind the gills to the base of the tail. Along the groove of the lateral line are hair-like nerve endings (*neuromasts*) set into a jelly-filled canal under the skin or scales. When the hairs are pushed by pressure from the water the fish can pick up movements of other critters nearby. The hairs also sense low-frequency sounds, speed of water currents and pressure waves that build up as the fish moves towards something in its way. The lateral line helps fish travel through murky water, find food, travel at night, stay together in a school, avoid enemies and even sense water temperature.

Now you have a sense of what it's like to be a fish in its watery world.

### Walleye

You can't miss the walleye's big silvery eyes. At night, this large predator uses those eyes to hunt shad, perch and other fish it finds in the backwaters of rivers and reservoirs where it lives.



### Largemouth bass

In clear waters good vision aids these fish in chasing down and engulfing other fish. In low light conditions, hearing and their highly developed lateral line help them find their meal.



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### Through the senses of a fish! Student activity:

Pick one of the fish that are mentioned and pictured in this reading.

Next, based on the information in the reading think about where your fish would likely live. Would it live near the surface or in deeper water? Would it hide in weeds or out in open waters? Then draw your fish in a lake or stream.

After that, draw in the things your fish might sense in its environment on a typical day in its life. Draw in things it might see, feel, hear, taste, smell or sense with its lateral line such as vegetation, things it would eat, lures of anglers, other fish and the like.

If your fish sees in color draw the things in color. If it does not see color, use gray and brown colors. You can label the things in your drawing to show if they are things your fish will see, hear, feel, taste, smell etc.

If you want to learn more about your fish's lifestyle, you can look at a fish field guide, or check out some Web site pages such as:

wildlife.utah.gov/projectwild/fishes.htm  
or  
www.enature.com/guides/select\_Fish-  
es.asp

### It's WILD!

Project WILD activities for teachers and students that correlate to this topic include the following:

- Fishy Who's Who
- Interview a Spider
- Fashion a Fish (focus on fish)
- Seeing is Believing!
- Sockeye Scents

### WILD about reading: books for learning more

– Peterson Field Guides: Freshwater Fishes by Lawrence M. Page and Brooks M. Burr, Houghton Mifflin, 1991.

– Peterson First Guide to Fishes of North America by Michael Filisky, Houghton Mifflin, 1998.

– Crinkleroot's 25 Fish Every Child Should Know by Jim Arnosky, Simon and Schuster, 1993.

– Freshwater Fish and Fishing by Jim Arnosky, Four Winds Press, 1982.

– Freshwater Fish by Bernice Brewster, Bookwright Publishers, 1988.

– The World of Freshwater Fish by Thomas D. Fegely, Dodd Mead, 1978.

– About Fish: A Guide for Children by Catheryn P. Sill, Peachtree Publishers, 2002.

– Fish by Steve Parker, Eyewitness Books, Knopf Publishing, 1990.

– What Is a Fish? by Allison Larin and Bobbie Kalman, Crabtree Publishers, 1998.

### WILD educator resources and happenings

– Utah Fish Posters: Contact Project WILD for information

– Interactive Fish ID Flashcards:  
Excellent fish education Web site:  
www.cnr.colostate.edu/~brett/fw300/  
flashcrd/

– Fish Videos for checkout from Project WILD:  
(Available for Project WILD-trained educators only)

- Bill Nye The Science Guy: Fish
- Fascinating Fishes
- Fish: Eyewitness Video

– WILD About ELK: Advanced Project WILD Educator Training, June 18-19, 2004. Details and registration form on Project WILD Web site.

### Bluegill

Warm seedy ponds, sloughs and small lakes are home for bluegills, a type of sunfish. Like their name implies, they wear blue scales around their gills. They eat aquatic insects, small crustaceans and snails, and in turn make a good meal for bigger predatory fish.



### Getting WILD

Utah's WILD Notebook is produced by Utah's Project WILD program. (Note: this publication is now replacing Project WILD's *Growing WILD / Nature's Call* publication.) WILD workshops, offered by the Utah Division of Wildlife Resources, provide teachers and other educators with opportunities for professional development and a wealth of wildlife education activities and materials for helping students learn about wildlife and its conservation. For a current listing of Project WILD educator workshops, visit the Project WILD Web site at [wildlife.utah.gov/projectwild](http://wildlife.utah.gov/projectwild) or e-mail [DianaVos@utah.gov](mailto:DianaVos@utah.gov).

